

Netra™ 20 Server

Just the Facts

(SunWIN token# 308340)



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Positioning

Introduction

Telecommunication companies need to deliver innovative services while remaining competitive. When deploying new data and voice services, the return on investment has to be considered over the long term, 5 to 10 years, which in turn requires protection of that investment. Any new services also require an upgrade path that is able to meet future performance demands.

Speed and information are the essence of government and military installations and the service provider world, as well as for the enterprise. To remain competitive and meet the pressures to deliver new and innovative services, these organizations must investigate and deploy new and innovative data management and server technologies. To maintain and exceed a certain level of profitability—a concern primarily of service providers and enterprises—they must maximize their revenue from every square foot of their data center space. Open, reliable, and robust systems are needed to achieve this goal.

To help achieve these goals, Sun is introducing the Netra™ 20 server, the next generation, UltraSPARC™ III processor-based follow-on product to the Netra t 1120/1125 servers. The Netra 20 server is part of a wider family of server and storage products designed to meet the demanding requirements for deployment within telecommunications, service provider, and network infrastructures. The Netra 20 servers feature list includes extensive system management capabilities, full rack mount support, and ruggedized packaging.

Product Overview

The Netra 20 server is the next generation, high-performance, UltraSPARC III processor-based, Netra server that continues to address the expanding market for open computing platforms and solutions for deployment within the network infrastructure. Features of the Netra 20 server include:

- UltraSPARC III processor, the third generation, 64-bit SPARC™ V9 architecture specifically crafted to support the most aggressive, real-world, networking environments
- Sun Solaris™ 8 Operating Environment, designed for multiprocessing and 64-bit computing where availability and stability are the key requirements
- Ability to operate in potentially hostile environmental conditions
- NEBS Level 3 certification (Netra 20 DC server only)
- Compact footprint
- Optimized for rack environments and space constrained environments
- DC and AC power supply options
- Alarms and high-availability options
- Attractive price/performance

The Netra 20 AC server operates in a 110/240 V AC environment. The Netra 20 DC server operates in a –48 to –60 V DC environment.



The Netra 20 systems initially will support up to two 750-MHz UltraSPARC III processors, with 8-MB cache each. They can support a maximum of:

- 8-GB memory
- Up to two 36-GB internal disk drives
- Four PCI cards (three long and one short)

Netra 20 servers support the Solaris 8 Operating Environment (and future releases), making them compatible with other Sun systems and allowing customers to develop applications on a commercial workstation or server and deploy them into the network infrastructure without modification.

Sun™ Cluster 3.0 software is supported, allowing customers to develop more fault-tolerant systems through the use of multiple Netra 20 systems.

An alarm facility is provided, with visible warning lights on the front and back and alarm output signals that can be interfaced to displays or network management software.

Netra t 1120/1125 Servers Compared to Netra 20 Servers

The Netra 20 is the next generation, UltraSPARC III processor-based follow-on product to the Netra t 1120/1125 servers. The following table shows the differences between the Netra t 1120/1125 servers and the Netra 20 servers.

Feature	Netra t 1120/1125 Servers	Netra 20 Servers
Size	4 U	4 U
NEBS Level 3 certified	Yes	Yes: Netra 20 DC No: Netra 20 AC
# of Processors	1-2 UltraSPARC II	1-2 UltraSPARC III
Clock Speed	300 / 440 MHz	750 MHz with future support for > 1 GHz processors
Cache	2 MB / 4 MB per processor	8 MB per processor
Max. Memory	2 GB	8 GB
Internal Disk	Up to 2 x 18 GB	Up to 2 x 36 GB
Disk Bus	UltraSCSI @ 40 MB/s	FC-AL @ 100 MB/s
Hot Swap Disks	No	Yes
PCI Slots	4 x full length	3 x full length, 1 x short
System I/O	1 x Ethernet 10/100 Mb/s 2 x Serial 1 x Parallel 1 x UltraSCSI	1 x Ethernet 10/100 Mb/s 2 x Serial (DB25 connector) 1 x Serial for LOM/Console (RJ45 connector) 1 x Parallel 1 x UltraSCSI (DB48 connector, 40 MB/sec) 1 x FC-AL 100 MB/s 4 x USB 12 Mb/s
Internal RMM	DVD-ROM (10X) and DAT (DDS-3)	DVD-ROM (10X) and DAT (DDS-4)
Isolated Grounds	Yes	No



Feature	Netra t 1120/1125 Servers	Netra 20 Servers
Isolated DC Feeds	No	Yes
Alarms Functionality	Alarms and LOMLite	Alarms and LOMLite2
Remote Control	Yes	Yes
System Identity Device	No	Yes
FRU ID Support	No	Yes
Operating Environment	Solaris 2.5.1, 2.6, 7, and 8	Solaris 8
Power Supply Unit	Single	Single

Product Family Placement

The Netra 20 systems occupy the middle ground of the Netra product family. The Netra 20 servers are designed specifically for rack intensive environments and were developed to maximize CPU density while maintaining the smallest possible footprint (17 inches by 19 inches). In addition, the server continues the Netra tradition of providing robust and rugged solutions for implementation in the widest range of data center conditions.

The table below summarizes the placement of servers in the Netra product family.

Product Name	Rack Units	Description
Netra X1 server	1	Entry level server for low-end and utility functions.
Netra T1 server	1	Rugged and flexible 1 U thin server for horizontally scalable applications.
Netra 20 server	4	Designed specifically for rack intensive environments and to maximize CPU density while maintaining a small footprint, the Netra 20 server offers higher performance and more processing capabilities than the Netra t 1120/1125 servers.
Netra t 1120 server Netra t 1125 server	4	Middle ground; designed to provide modular server capabilities for network environments where reliability and physical robustness are a requirement. Note: Netra 20 servers will eventually replace Netra t 1120/1125 servers.
Netra t 1400 server Netra t 1405 server	6	Offers higher server performance, more processing capability, more memory, PCI slots, and disk capacity than the Netra t 1120/1125 server.

Key Messages

The Netra 20 server is the first deployment of an UltraSPARC III processor in a Netra platform. This combined with other features and product enhancements provide improved performance, increased expandability, and enhanced serviceability over the previous generation. Key messages for the Netra 20 server include:

- The Netra 20 server is the high-performance, dual processor server of choice that reduces costs and maximizes revenues for telecommunications companies building the next generation IP infrastructure because it optimizes real estate utilization; meets mandatory requirements for deployment in central offices through NEBS certification, a DC power option, and a shallow depth; and provides reliability, availability, and scalability through the award-winning UltraSPARC III 64-bit microprocessor and rock-solid Solaris 8 Operating Environment.



- UltraSPARC III microprocessor and Solaris 8 Operating Environment enable an architecture that scales readily, provides binary compatibility with existing applications, and maintains consistency across all tiers of the network for service providers deploying three-tiered architecture for Internet data centers.
- Designed specifically for rack optimized environments.
- Can be installed in a variety of rack configurations (for example, 2-post or 4-post) to fit in server network environments.
- Designed with ease-of-management features that include front and back LEDs, front-to-back cooling, front accessible hot-swappable drives, removable system configuration card, space for system label, and consistent cable management.
- Ruggedized packaging provides a high level of system reliability and helps ensure that Netra 20 servers will not be adversely affected by the environment in which they are installed.
- Available in AC or DC power.
- Easier administration and recovery is provided through lights-out management (LOM) and a system configuration card (SCC). LOM provides monitoring of the system and diagnosis, even when Solaris is not running and the system is in stand-by mode. The SCC enables quick replacement of a faulty system, transferring the system identity to ensure rapid recovery.
- Protects investments in existing infrastructure by maintaining consistency with Netra values: front-to-back cooling, rack optimization, status LEDs, and remote management.

Target Users

Target users are found in the following market areas:

- Network equipment providers, including wireless and wireline telecommunications infrastructures
- Government and military installations
- Internet data centers and co-location facilities with Tier 2 applications in a three-tier network architecture
- Manufacturing, utilities
- Service providers deploying data centers, POPs, or metropolitan area networks



Target Markets

Industry/Customer	Key Features to Highlight
Network equipment providers and telecommunications companies	<ul style="list-style-type: none"> • Meets mandatory requirements for deployment in central office –type environments: NEBS Level 3 certification (Netra 20 DC server), DC power, shallow depth (19.5 inch) • Minimal footprint to maximize data center space usage • Flexible to fit in virtually any rack–type environment • Uses fibre channel technology for connectivity, reliability, and high speed data transfer • Reliability, availability, and scalability provided by the UltraSPARC III 64–bit microprocessor and Sun Solaris 8 Operating Environment
Government, military, manufacturing, utilities, IT infrastructures	<ul style="list-style-type: none"> • NEBS Level 3 certification (Netra 20 DC server) • Minimal footprint to maximize data center space usage • High performance • Reliability and serviceability • Availability
Internet data centers and co–location facilities	<ul style="list-style-type: none"> • Reliability, availability, and scalability provided by the UltraSPARC III 64–bit microprocessor and Sun Solaris 8 Operating Environment • LOM software for remote management and monitoring • Ruggedized packaging • Uses fibre channel technology for connectivity, reliability, and high speed data transfer



Selling Highlights

Market Value Proposition

- **Established base**

Netra based servers are used around the globe in a variety of locations including telecommunications central offices and wireless base stations, Internet data centers, metropolitan area networks, POPs, and enterprise service provider infrastructures.

- **Robust and reliable**

Sun's high-standard of hardware design and build, together with the proven reliability of the 64-bit UltraSPARC III microprocessor, enables Netra 20 servers to operate in less than ideal environments.

- **Confidence**

Sun's expertise in developing equipment for the telecommunications, service provider, and enterprises allows investments in server technology that are reliable and meet today's demanding performance requirements.

- **Investment protection**

The scalability, binary compatibility, and flexibility of the UltraSPARC processor architecture and the Solaris Operating Environment provides customers with investment protection.

- **Ruggedized packaging**

Ruggedized packaging provides a high level of system reliability which helps ensure that Netra 20 servers continue to operate under the extremes of environmental conditions.

- **Standards-based open systems**

Netra 20 servers have been designed and built as open systems at the hardware, interface, and software levels.

- **Rack mountable**

The Netra 20 servers are rack mountable in 19-inch, 23-inch, 24-inch, and 600-mm racks. They are also rack-enabled for 2- and 4-post rack mounts.

- **Rack-intensive environments**

Features that include Lights Out Management; a system configuration card; FRU ID; front-to-back cooling; easy access to PCI slots; front-accessible, hot swappable hard disk drives; and numerous connectivity options enable Netra 20 servers to provide the optimal server solution for deployment in rack-intensive environments.

Netra 20 AC Server Value Proposition

The Netra 20 AC server with UltraSPARC III microprocessors and Solaris 8 Operating Environment enables an architecture that scales readily, provides binary compatibility with existing applications and maintains consistency across all tiers of the network. The Netra 20 AC server is the high-performance, dual processor server of choice that reduces costs and maximizes revenues for service providers and enterprises as well as military and government installations by offering peace of mind through ruggedized packaging, easier administration and recovery, and investment protection.



Netra 20 DC Server Value Proposition

The Netra 20 DC server is the high-performance, dual processor server of choice that reduces costs and maximizes revenues for telecommunications companies building the next generation IP infrastructure because it maximizes real estate usage; meets mandatory requirements for deployment in central offices; provides reliability, availability, and scalability; and protects investments.

Applications

The Netra 20 server is appropriate for use in the following applications:

- The Netra 20 AC server is targeted at Tier 2 applications in a three-tiered network architecture. Examples include:
 - Web serving
 - Authentication and security
 - Application serving
 - WAP gateways
- In POPs to provide complete clustered solutions that include:
 - Web caching
 - Content delivery
 - Streaming media
- Customer premises remotely deployed caching servers
- Network equipment manufacturers-related applications that include:
 - Softswitch implementations
 - Home location registers, visitor location registers, and service control points
 - Signaling gateways
 - Voice browsing/navigation

Compatibility

The Netra 20 servers run the Solaris 8 Operating Environment.

For a complete list of Sun products or products from third-party vendors, visit the following Web sites:

- Sun internal Web site at <http://vsp.eng/products/hardware/netra>
- Sun Reseller Web site at <http://reseller.sun.com>
- Sun external Web site at <http://www.sun.com/netra/products/netrat/t4/>



Features, Functions, Benefits

Feature	Function	Benefit
UltraSPARC III processor	<ul style="list-style-type: none"> • Maintain binary backward compatibility with applications developed for the SPARC architecture • Add computing resources quickly • Maximize multiprocessor scaling performance • Increase memory access and lower latencies 	<ul style="list-style-type: none"> • Helps protect investment • Helps increase return on investment (ROI) • Helps enable massive scalability while reducing downtime and expenses • Provides improvements in system performance over its predecessor • Improve application performance
Automatic error recovery in the microprocessors	<ul style="list-style-type: none"> • Minimize the impact of errors • Improve recovery speed 	<ul style="list-style-type: none"> • Helps increase reliability • Helps ensure data integrity • Helps maximize uptime and availability
Error containment capabilities in the microprocessors	<ul style="list-style-type: none"> • Prevent copy-back errors from propagating through a multiprocessor system • Identify and locate errors 	<ul style="list-style-type: none"> • Helps minimize downtime • Helps increase availability
Uptime bus	<ul style="list-style-type: none"> • Diagnose system bus errors when the main bus cannot be accessed 	<ul style="list-style-type: none"> • Helps increase reliability • Helps increase availability
Parity protection on memory arrays	<ul style="list-style-type: none"> • Supports single error detection and single error correction (SED/SEC) 	<ul style="list-style-type: none"> • Helps increase reliability • Helps ensure data integrity • Helps increase availability
Solaris 8 Operating Environment	<ul style="list-style-type: none"> • Binary compatibility • Access more than 12,000 applications without recompiling 	<ul style="list-style-type: none"> • Helps maximize uptime • Helps reduce support and maintenance costs • Faster time to market
Fireplane system interconnect	<ul style="list-style-type: none"> • Supports peak memory bandwidth of 4.8 GB/s and sustained memory bandwidth of 2.4 GB/s which enables faster throughput speeds • Reduce time spent waiting for transactions to complete 	<ul style="list-style-type: none"> • Helps increase performance • Helps increase productivity
Up to 8-GB main memory	<ul style="list-style-type: none"> • Increase memory capacity • Support a wider set of applications • Host in-memory databases 	<ul style="list-style-type: none"> • Helps maximize processing • Helps increase performance
USB ports	<ul style="list-style-type: none"> • Connect external peripherals 	<ul style="list-style-type: none"> • Helps enable easy configuration management
External FC-AL port	<ul style="list-style-type: none"> • Increases throughput • Connects external storage systems • Overcomes SCSI cable length limits 	<ul style="list-style-type: none"> • Helps maximize performance • Place servers where they make the most business sense, not dictated by cabling



Feature	Function	Benefit
Fibre channel hard drive	<ul style="list-style-type: none"> • Transfers data at higher speeds more reliably 	<ul style="list-style-type: none"> • Helps maximize throughput • Helps customers meet their SLAs
System configuration card and reader	<ul style="list-style-type: none"> • Transfer system identity and configuration information to another server 	<ul style="list-style-type: none"> • Helps increase availability • Helps minimize downtime
Ruggedized enclosure	<ul style="list-style-type: none"> • Operate in environments where there is dust or other pollutants/air contaminants • Resist/retard fire and other electrical hazards 	<ul style="list-style-type: none"> • Helps increase reliability • Helps maximize availability • Helps decrease downtime due to environmental conditions
NEBS Level 3 certification (Netra 20 DC server, only)	<ul style="list-style-type: none"> • Comply with regulatory regulations for deployment in central office environments • Operate in earthquake Zone 4 environments 	<ul style="list-style-type: none"> • Allows for deployment in central offices • Helps maximize availability • Helps decrease downtime due to environmental conditions
Consistent, minimal footprint	<ul style="list-style-type: none"> • Fits the same volumetric requirements as the existing Netra 1120/25 enclosure • Small form factor enables multiple systems to be densely packed into existing racks 	<ul style="list-style-type: none"> • Helps protect investment • Helps maximize space usage • Helps reduce operating costs
DVD-ROM	<ul style="list-style-type: none"> • Increase media access capabilities and speeds 	<ul style="list-style-type: none"> • Helps maximize throughput
Rack optimized	<ul style="list-style-type: none"> • Stack multiple servers in a rack • Supports sliding rack kit • Deploy in 2- and 4-post racks with 19-inch, 23-inch, 24-inch and 600-mm rack widths • Deploy in 24-inch and 600-mm deep racks 	<ul style="list-style-type: none"> • Maximize rack and data center floor space • Maximize revenue • Rapid deployment • Higher density computing
LOM	<ul style="list-style-type: none"> • Detect and resolve problems remotely • Monitor the server remotely • Restart the server automatically • Keep a log of the last 600+ events 	<ul style="list-style-type: none"> • Helps reduce downtime • Helps increase availability • Helps reduce administration costs
Environmental monitoring through I ² C interface	<ul style="list-style-type: none"> • Monitor CPU temperature, fan speed, enclosure temperature 	<ul style="list-style-type: none"> • Helps reduce downtime



Enabling Technology

The Netra 20 servers have been designed to meet the physical specifications (rack mount and high environmental tolerance), open standards, reliability, and compact size needs of military and government customers and service providers as well as network equipment providers, making the Netra 20 server suitable for general network infrastructures. This capability has been achieved by combining existing Sun strengths, advanced technologies, and specialist skills in the development of ruggedized systems. Many standard, well-proven Sun components are deployed to take advantage of Sun's continued investment in open technology leadership.

Technology Improvements

The Netra 20 servers take advantage of key improvements in memory bus bandwidth and processor technology. The design supports single or dual UltraSPARC III processors running at 750 MHz. As a member of the UltraSPARC family of CPUs, these servers have full binary compatibility.

UltraSPARC III Processor

The Netra 20 servers are the first Netra branded servers to use the UltraSPARC III processor, the latest generation of the SPARC processor family and the third generation of 64-bit UltraSPARC chips.

The SPARC V9 processors represent a significant advance for the industry. The SPARC V9 processors provide 64-bit data and addressing, fast context switching, support for advanced compiler optimizations, and an efficient design for superscalar pipeline. All of this has been accomplished with full binary compatibility for existing SPARC processor-based application programs.

The 64-bit UltraSPARC III processors come with level-two cache of 8 MB. The processor is binary compatible with all Sun SPARC based systems. The all-new UltraSPARC III CPU provides very high integer and floating-point performance to address the needs of the most computationally demanding applications. Capable of 64-bit data and addressing, UltraSPARC III processors have a number of important features to improve operating system and application performance:

- Larger cache size, lower cache latency, improved branch prediction, and higher clock rate
- 6-way superscalar issue, no-stall 14 stage pipeline; 16 K-entry branch prediction array; high efficiency trap management
- 4-way associative on-chip 64 KB data and 32 KB instruction cache; support for multiple outstanding memory requests
- 8 MB of external level-two cache and integrated memory controller in CPU chip, which greatly reduces memory access latency
- Up to 8 GB of memory can transfer data at up to 2.4 GB/sec
- Interface to Sun Fireplane interconnect supports peak data rates of nearly 4.8 GB/sec
- Enhanced VIS instruction set with three new instructions for high-performance on multimedia and networking applications



Sun Fireplane Interconnect

The Fireplane system interconnect is used in a wide range of Sun systems. It combines the simplicity of a single bus with a high bandwidth normally associated with a switch-based interconnect. This process is accomplished with the complete separation and independence of address and data paths.

One of the ways that the Fireplane system interconnect is able to achieve significant bandwidth gains is by allowing multiple transactions to be “in flight” on the interconnect at the same time. Allowing requests to the system interconnect to be fulfilled in an order different from which they were issued reduces the time spent waiting for transactions to complete and permits the interleaving of transactions on the interconnect and within the processor.

Fireplane system interconnect features provide the Netra 20 servers with capabilities that include:

- High bandwidth

With a 150 MHz clocking rate, Fireplane delivers up to 4.8 GB per second of bandwidth per bus segment.

- Low latency
- Load balancing

An innovative flow control approach, where the target device pulls the data instead of the data being pushed by the device writing the transaction, helps ensure a balanced usage of system bandwidth between processors and translates into a more predictable response time under heavy load.

- Timing control

New signaling technology compensates automatically for voltage, temperature, and process variations in VLSI chips; better control over timing margins translates into a higher clock frequency on wide data paths (288 bits at 150 MHz in the Netra 20 server).

- Flexible data switch

Removable System Configuration Card

The system configuration card (SCC) is used to set the identity and configuration parameters of the machine. The SCC replaces the NVRAM as a nonvolatile store of configuration information and machine identity in all user-visible ways.

When a server develops a fault such that the application software ceases to run or the system needs to be replaced or upgraded, the SCC can be removed—as well as any disk drives—and placed in another server, allowing the contents of the card to be used as a control for the new machine’s configuration, minimizing system downtime and assuring high availability.

USB Ports

Two USB connectors are provided, each with two USB ports, for a total of four USB ports. The USB ports can be used to connect external peripheral devices, such as a keyboard and mouse or an external storage device. The USB interface cannot, however, be used for LOMlite2 operations.



Fibre Channel Technology

Fibre channel is a high performance network medium that is capable of delivering the network-oriented backbone needed for performance, open connectivity, availability, and scalability.

The Netra 20 servers feature up to two 36 GB fibre channel hard drives and one external FC-AL port. Fibre channel hard drives provide increased throughput compared to SCSI drives. An FC-AL port can be used to connect an external storage device or a backup device.

Removable Media

The Netra 20 servers feature two drive bays for an optional DVD-ROM drive or a DAT DDS-4 tape drive.



System Architecture

The Netra 20 rack mount systems are designed for balanced system performance in applications, providing excellent I/O, memory, and processing capabilities.

Robust, Ruggedized Packaging

The Netra 20 servers provide robust and rugged solutions for implementation in the widest range of environmental conditions. The server has been designed to provide the highest levels of protection from temperature fluctuations, humidity and dust levels, and vibration.

Rack Mount

The chassis is designed to be rack mounted horizontally into either 2- or 4-post 19-inch, 23-inch, 24-inch, or 600-mm racks with the appropriate kits (a 19-inch rack mount kit is included with the ship kit; other sizes are available as X-options). Location points for industry-standard rails have been added, providing customers with numerous possibilities for rack mounting.

Installation and Serviceability

The system disks and removable media (DAT and DVD-ROM) are serviceable from the front of the system, and accessed from behind the front panel, which also houses the optional air filter. The power supply and all cabling are accessed and serviced from the rear of the system. Front and rear servicing is achieved while the unit is still mounted in a rack. This service strategy and the front-to-back cooling allows Netra 20 servers to be mounted adjacent to each other, without the need for vertical gaps.

To service components within the server, such as the memory, processor(s) and PCI cards, the server needs to be slid from the rack (using the optional slide adaptor rails X-option) or removed entirely from the rack.

Remote Management and Monitoring

Remote management and monitoring capability is provided by LOMlite2, a hardware and software feature that allows server administrators to monitor server environmentals, set alarms, and automatically reboot Netra 20 servers remotely. Customers can use LOMlite2 to remotely boot and shut down the server. LOMlite 2 can run independently from a centralized management console or as part of Sun Management Center, or another third-party management software suite via SNMP MIBs. LOMlite2 is provided as a standard part of the Netra 20 server system.

The LOMlite2 provides the following:

- Host Interface
 - Host Serial Interface
 - Host Watchdog, with the ability to configure automatic system recovery in the event of a system hang
 - Host Reset



- Management Interface
 - Serial (dedicated or combined with host Console)
 - Seamless Console Switching
 - Modem support with Phone Home
- Host Power Management
 - Host Power Control
 - Host Shutdown
 - Programmable Delayed Host Power–Up Option
 - Host Power–up Decline Option
 - Power State Memory
- Environmental Monitoring via I²C
 - Fan Speed Monitoring with underspeed detection
 - Fan Speed Control
 - Enclosure Temperature Monitoring
 - CPU temperature monitoring
 - Host Supply Voltage Monitoring
- Status Management via I²C
 - PSU Status Monitoring
 - Fault Flag
 - Host Power Flag
 - Alarms Flags
 - Event Log
 - LED Control

UltraSPARC Processor

Like previous generations of SPARC processors, the Netra 20 server's processors are mounted on field-installable cards for ease of installation and upgrades.

Memory

The Netra 20 server has eight memory slots supporting up to 8 GB of DRAM memory. Memory is organized into two groups of four DIMMs. DIMMs within a group must be identical, but the two groups can be populated with different DIMMs.

System I/O

The Netra 20 servers provide the following I/O channels directly from the main system board:

- Two synchronous serial RS232 ports
- One parallel port
- One SCSI port (40 MB/s)



- One external FC–AL port through HSSDC connector (100 MB/s)
- Four USB ports (12 Mb/s)
- On–board 10/100 Mb/s Fast Ethernet port

Netra 20 servers are headless. However, the USB ports can be used to connect a keyboard, mouse, or other peripheral device.

External/Expansion I/O

The Netra 20 server has four PCI slots that support three long and one short PCI cards as follows:

- One full–size PCI slot, 32/64–bit, 66 MHz
- Two full–size PCI slots, 32/64–bit, 33 MHz
- One half–size PCI slot, 32/64–bit, 33 MHz

The system can support any industry–standard PCI v2.1 cards and a range of Sun–branded PCI cards including the following (non–NEBS certified):

- Freshchoice
- FastEthernet
- QFE
- GBE/P2.0
- UTP P/3.0 (Cassini)
- HSI/P 2.0
- SAI/P 3.0
- ATM–155MMF
- ATM–155UTP
- GBE/FCAL combo
- SSL (Mercury 1)
- Dual–channel Differential SCSI
- Single port FC–AL w/ Switch–Fabric support

Storage

Internal data storage for the Netra 20 servers is provided by up to two fibre channel 36–GB hard drives, each of which is capable of 100 MB/sec transmit or receive data bandwidth.

External data storage can be connected via a differential UltraSCSI PCI card, SCSI port, or an FC–AL port. RAID and JBOD can be supported. The following storage and tape library options are supported:

- Netra st A1000 storage subsystem
- Netra st D1000 storage subsystem
- Netra st D130 media enclosure
- Sun StorEdge™ A1000 array
- Sun StorEdge D1000 array
- Sun StorEdge A5100/A5200 array
- Sun StorEdge T3 array



Removable media storage in the Netra 20 servers can be added into two front-accessed media bays, one bay for an optional DVD-ROM drive and the other for an optional 12- to 24-GB DDS-4 DAT drive.



Reliability, Availability, and Serviceability (RAS)

Reliability

The Netra servers are associated with a higher level of reliability, being specifically designed to meet the demands of deployment within telecommunications central offices, military and government installations, Internet data centers, and IT network infrastructures.

The Netra 20 server's reliability is based around the robust and proven Solaris Operating Environment and its mature and high performance SPARC processor technology.

The Netra 20 server is designed to meet the demanding criteria of NEBS Level 3 (only the Netra 20 DC server is certified to NEBS Level 3). This is the most stringent level and is mandatory for deployment in telecommunications central offices. Certification means that the Netra 20 server has been independently certified to provide service over an extended range of environmental and physical conditions, which is evidence of the enhanced reliability of the Netra 20 server.

Availability

The Netra 20 server offers users a high level of availability through hot-swap disks and system configuration cards which enable a new system to be brought on-line quickly, while retaining the identity of the failed system, thus avoiding the need for reconfiguration and administration.

System availability is also enhanced through the use of a programmable hardware watchdog on the LOM card which initiates a system reboot in the event of a system hang or software failure. Environmental monitoring ensures that system administrators remain in control of the server and have the information necessary to ensure smooth operation. Additionally, system administrators are warned of conditions which would lead to system failure if not dealt with, such as high temperature conditions.

The Netra 20 server fully supports Sun Cluster 3.0 software with the Netra st D1000 storage array, which provides the highest level of system service availability. Sun Cluster 3.0 software is also being qualified with the Netra 20 server and the Sun StorEdge T3 array.

Serviceability

The serviceability of the Netra 20 server is enhanced over its predecessor, the Netra t 1120/1125 server, in a number of ways:

- A full complement of LEDs, both front and back, that indicate service actions and system status.
- Easy access to memory and PCI slots on the motherboard.
- Hot-swappable, front-accessible system disks with LEDs indicating when it is safe to do so, thus ensuring data integrity.
- A rack slide adaptor available for the 19-inch rack-mount kit which enables the Netra 20 server to remain in the rack and slide out to facilitate service actions which require the lid to be removed, such as memory, processor, or PCI card replacement and/or upgrade.



- Support for FRU ID, which is the solution for capturing, transmitting, and analyzing Field Replaceable Unit (FRU)–specific configuration, diagnosis, and failure information associated with a particular FRU. The following Netra 20 modules support FRU ID:
 - All DIMMS (x8)
 - Both CPU modules
 - FC–AL backplane
 - LOMlite2 card
 - System motherboard
 - Both AC and DC power supplies
 - System Configuration Card Reader



Requirements and Configuration

Licensing/Usage

Netra 20 servers come with a Solaris Server License.

Interconnect

FC-AL port

Processor Options

Architecture	<ul style="list-style-type: none">• One or two UltraSPARC III at 750 MHz
Cache	<ul style="list-style-type: none">• 8 MB integrated second-level
Main Memory	<ul style="list-style-type: none">• 8 slots populated in two banks of four 128, 256, 512, or 1024 MB DIMMs

Standard Interfaces

Network	<ul style="list-style-type: none">• Ethernet/FastEthernet
I/O	<ul style="list-style-type: none">• FC-AL port: 100 MB/s, Fast/Wide SCSI port: 40 MB/sec
Expansion Bus	<ul style="list-style-type: none">• Four internal PCI 2.1 compliant slots

Mass Storage and Media

RMM	<ul style="list-style-type: none">• Optional DVD-ROM, DAT
Internal Disk	<ul style="list-style-type: none">• Up to two 3.5-inches by 1-inch fibre channel 36 GB
External Storage	<ul style="list-style-type: none">• Sun Netra D130 media enclosure, Sun StorEdge A1000/D1000 array, Sun StorEdge T3 array

Software

Operating Environment	<ul style="list-style-type: none">• Solaris 8
Languages	<ul style="list-style-type: none">• Java™, standard Sun-supported languages
Networking	<ul style="list-style-type: none">• ONC™/NFS™, TCP/IP, SunLink™ OSI, MHS, IPX™/SPX, DCE
Management	<ul style="list-style-type: none">• Sun Management Center, SNMP/MIBs, SunVTST™, SRS Ready
High availability	<ul style="list-style-type: none">• Sun Cluster 3.0 software, LOMLite2 software



Chassis Dimension and Weight

	U.S.	Metric
Height	6.97 (4 RU) inches	177 mm
Width (without mounting ears)	17.13 inches	435 mm
Depth (with front bezel)	19.53 inches	496 mm
Weight	60 lb	27.30 kg
Shipping Weight (product and packing)	62 lb	28 kg

Environment

The Netra 20 server is designed to meet the following requirements:

Power Requirements

Operating	AC: 90 to 264 V AC, 47 to 63 Hz DC: -48 to -60 V DC (dual isolated inputs)
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Temperature

	Fahrenheit	Celsius
Operating	41° F to 104° F, 20% to 80% relative humidity, noncondensing, subject to a maximum absolute humidity of 0.024 kg water/kg dry air	5° C to 40° C, 20% to 80% relative humidity, noncondensing, subject to a maximum absolute humidity of 0.024 kg water/kg dry air
Nonoperating	-40° F to 104° F, 10% to 95% relative humidity, noncondensing	-40° C to 70° C, 10% to 95% relative humidity, noncondensing

Relative Humidity

Operating	20%–80% non–condensing, subject to a maximum absolute humidity of 0.024 kg water / kg dry air
Nonoperating	10% to 95% noncondensing

Seismic

GR-63-CORE requirements for earthquake risk Zone 4
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Noise (in accordance with ISO 9296)

Operating acoustic noise	Less than 60dBA (GR-63-CORE Test Method)
Idling acoustic noise	Less than 60dBA (GR-63-CORE Test Method)



Regulations

The Netra 20 server meets or exceeds the following requirements:

Safety	UL 1950/CAS C22.2 No. 950, EN 60950 (73/23/EEC), IEC 950, CCIB for PSU, GOSTMark
Emissions	CFR Title 47 FCC Part 15, EN 55022 (89/336/EEC)
Immunity	EN 50082-1 (89/336/EEC)
Telecom environment certification (Netra 20 DC server)	Telcordia: GR-63-CORE, GR-1089-CORE, TR-NWT-00295, SR 3580 NEBS Level 3
Certification <ul style="list-style-type: none">• Safety• EMC	<ul style="list-style-type: none">• cULus Mark, TÜV GS Mark, CE Mark• CE Mark, (93/68/EEC), FCC authorized Class A, VCCI, BSMI, CTICK



System Management

System Administration

Netra 20 servers can be administered through the LOMlite2 software that is provided as a standard component. LOMlite2 can be interfaced to Sun Management Center, SNMP MIBs, or directly via the console.

Operating Environment

The Netra 20 systems include one of the industry's leading operating system, the Solaris Operating Environment. Built on the latest UNIX® technology, the Solaris Operating Environment:

- Delivers excellent scalability and performance
- Provides easy access to a wide range of computing environments and network technologies
- Delivers a competitive advantage to businesses through networked computing, scalability, and multi-architecture support
- Provides an advanced, superior solution for all customer needs
- Is an industrial-grade solution with the performance, quality, and robustness to deliver mission-critical reliability.

The Solaris 8 Operating Environment Release 04/01 and 07/01 and above are supported.

Clustering

Clustering software is available for the Netra 20 servers. Refer to the Web sites <http://www.sun.com/clusters/> or <http://suncluster.eng.sun.com/> for further details. Part numbers are available in the Netra 20 server configuration tool and the X-option list.



Ordering Information

Netra 20 AC servers are sold in single units and are available to order with factory installed components. To complete a valid sales order for a system, follow the steps below. See the End User Price Book for prices and the latest options. Each step represents a line item on a sales order.

Sun Netra 20 Server Ordering Flowchart (Standard and Fixed Configurations)

From clean order scheduling to product shipping, the lead times are one day for standard configurations and eight days for fixed configurations.

1. Order base configuration (required).
2. Order rack mount kits other than 19 inch (optional).
3. Order power cord (required).

Standard Configuration Part Numbers

Order Number	Title and Description
N28-URF1-9S-512AV	LW2+, AC/750MHz/512MB/1x36G (AC Std Config)
N28-URF2-9S-2048AV	LW2+, AC/2x750MHz/2GB/2x36G (AC Std Config)
N28-URF2-9S-4096AV	LW2+, AC/2x750MHz/4GB/2x36G (AC Std Config)
N28-DURF1-9S-512AV	LW2+, DC/750MHz/512MB/1x36G (DC Fixed Config)*
N28-DURF2-9S-2048AV	LW2+, DC/2x750MHz/2GB/2x36G (DC Fixed Config)*
N28-DURF2-9S-4096AV	LW2+, DC/2x750MHz/4GB/2x36G (DC Fixed Config)*

* DC configuration will not be available at GA of Netra 20 AC server.

Sun Netra 20 Server Ordering Flowchart (xATO)

Allow eight days from clean order scheduling to product shipping for ATO orders.

1. Order base configuration (required).
2. Order processor modules (required).
3. Order memory (required).
4. Order internal disk drives (required).
5. Order removable media devices (optional).
6. Order rack mount kits other than 19 inch (optional).
7. Order power cord (required).
8. Order PCI cards (optional).
9. Order Solaris Operating Environment (optional).



Order Number	Title and Description
N28-AA	Base configuration for AC version (xATO)
N28-AD	Base configuration for DC version (xATO)

Optional Components

X-Option Number	Description
X6990	750-MHz US III Processor with 8-MB L2 cache
X7099A	19-inch rack slide adaptor
X6902A	23-inch rack-mount kit
X6903A	24-inch rack-mount kit
X6904A	600-mm rack-mount kit
X7077A	Lights-Out Management software CD
X7050A	512-MB memory expansion, 4 x 128-MB DIMMs
X7053A	1-GB memory expansion, 4 x 256-MB DIMMs
X7051A	2-GB memory expansion, 4 x 512-MB DIMMs
X7052A	4-GB Memory Expansion, 4 x 1-GB DIMMS
X6724A	FC-AL 36-GB internal hard disk drive
X6168A	Internal 10X DVD-ROM
X6295A	Internal 4-mm DDS4 DAT tape drive
X386L	Australian power cord
X312L	Continental European power cord
X383L	Danish power cord
X348L	Italian power cord
X311L	North America/Asian power cord
X314L	Swiss power cord
X317L	UK power cord
X6541A	PCI card, Dual Differential SCSI
X1032A	PCI card, 10/100BaseT F/W UltraSCSI
X1033A	PCI card, 10BaseT FastEthernet
X1034A	PCI card, Quad FastEthernet
X1133A	PCI card, SSL Crypto Accelerator
X1155A	PCI card, HSI/P 2.0
X2156A	PCI card, SAI/P 3.0
X1157A	PCI card, ATM-155MMF P/4.0
X1158A	PCI card, ATM-155UTP P/4.0



X-Option Number	Description
X1150A	PCI card, Gigabit Ethernet UTP P/3.0
X2069A	PCI card, Combined FC-AL and Gigabit Ethernet
X6799A	PCI card, Single Fiber Channel Network Adaptor
X6542A*	PCI card, Hardware RAID Controller
X6540A*	PCI card, Dual Channel SE UltraSCSI

* Available at GA of Netra 20 DC 100 server.

Solaris Operating Environment and Localized Media Kit

Part Number	Description
SOLZS-080B9AYS	Solaris 8 Standard (Latest Rel.), Worldwide Media w/Minimum Install Documentation
SOLZS-080B9AYM	Solaris 8 Standard (Latest Rel.), Worldwide Media and English Install Documentation
SOLZS-080B9AYA	Solaris 8 Standard (Latest Rel.), Worldwide Media and French Install Documentation
SOLZS-080B9AYB	Solaris 8 Standard (Latest Rel.), Worldwide Media and German Install Documentation
SOLZS-080B9AYE	Solaris 8 Standard (Latest Rel.), Worldwide Media and Italian Install Documentation
SOLZS-080B9AYF	Solaris 8 Standard (Latest Rel.), Worldwide Media and Spanish Install Documentation
SOLZS-080B9AYG	Solaris 8 Standard (Latest Rel.), Worldwide Media and Swedish Install Documentation
SOLZS-080B9AYC	Solaris 8 Standard (Latest Rel.), Worldwide Media and Japanese Install Documentation
SOLZS-080B9AYH	Solaris 8 Standard (Latest Rel.), Worldwide Media and Korean Install Documentation
SOLZS-080B9AYJ	Solaris 8 Standard (Latest Rel.), Worldwide Media and Trad. Chinese Install Documentation
SOLZS-080B9AYD	Solaris 8 Standard (Latest Rel.), Worldwide Media and Simp. Chinese Install Documentation

Field Replaceable Units

The following field replaceable units (FRUs) are available for the Netra 20 servers. Customers can choose to have hot standby servers and use the system configuration card feature or replace individual components.

FRU Part Number	Field Replaceable Units (FRUs)
F501-5893	LOMlite2 module
F300-1496	AC power supply unit



FRU Part Number	Field Replaceable Units (FRUs)
F300-1497	DC power supply unit
F540-4795	Power distribution board
F501-5965	System configuration card reader
F370-4360	127 mm fan assembly
F501-5915	System status LED card including power switch
F540-4794	FC-AL backplane
F530-3032	3.3/5V cable kit
F560-2631	Power cable kit
F560-2632	Data cable kit
F501-5938	System motherboard
F501-5675	750 MHz processor module
F501-4489	FRU, ASSY, SDRAM, DIMM, 128 MB. Order 4 to make a set.
F501-5401	FRU, ASSY, SDRAM, DIMM, 256 MB. Order 4 to make a set.
F501-5030	FRU, ASSY, SDRAM, DIMM, 512 MB. Order 4 to make a set.
F501-5031	FRU, ASSY, SDRAM, DIMM, 1 GB. Order 4 to make a set.
F540-4525	36-GB FC-AL disk
F390-0028	DDS-4 4 mm DAT drive
F390-0025	10X DVD-ROM drive
F540-5023	PSU fans assembly

Upgrade Paths

The following items can be upgraded:

- Service and support plan
- Memory and system upgrade programs are being developed and will follow General Availability

Existing Netra t1120/1125 server customers may upgrade to Netra 20 servers under the Sun Upgrade Allowance Program (Sun UAP). This program allows customers to protect their current investment by receiving value for the trade-in of the Netra t1120/1125 server. Refer to the Upgrade Pathfinder at <http://ibb.eng/upgrades/> for more details on Sun UAP, upgrade paths, and allowances.



Service and Support

The SunSpectrumSM program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris Operating Environment software, and telephone support for Sun software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

FEATURE*	SUNSPECTRUM PLATINUM SM Mission-critical Support	SUNSPECTRUM GOLD SM Business-critical Support	SUNSPECTRUM SILVER SM Systems Support	SUNSPECTRUM BRONZE SM Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Personal technical account support	Yes	Yes	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	No
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
Customer-defined priority setting	Yes	Yes	Yes	No
– Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
– Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
– Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
Additional contacts	Option	Option	Option	Option
Enhanced Support Features				
Mission-critical support team	Yes	Yes	No	No



FEATURE*	SUNSPECTRUM PLATINUMSM Mission-critical Support	SUNSPECTRUM GOLDSM Business-critical Support	SUNSPECTRUM SILVERSM Systems Support	SUNSPECTRUM BRONZESM Self Support
Sun Vendor Integration Program (SunVIP SM)	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve SM license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier SM Service	Yes	Yes	Yes	Yes

*as of 18 September 2001

Warranty

Standard one-year return-to-depot (15-day turnaround).



Glossary

1 RU	A rack unit is a vertical unit of measurement corresponding to 1.75 inches.
AC	Alternating current.
ASR	Automatic server restart. A feature of the LOM module that reduces downtime from system lock-up. ASR enables administrators to configure the server to restart automatically in case of a software lock-up.
ATM	Asynchronous transfer mode. ATM is a network technology that supports realtime voice, video, and data. ATM is used as a backbone technology by major enterprises and ISPs.
Carrier grade	Ruggedized, rack-mountable systems with features including remote alarm capabilities, front-back cooling, front accessibility of media, rear cabling, and rugged NEBS-compliant packaging.
Density	Number of units in a given amount of space.
Ecache	External cache. Memory cache external to the CPU chip, also referred to as L2 cache.
Ethernet 10/100BASE-T	The most widely used LAN access method defined by the IEEE 802.3 standard; uses standard RJ-45 connectors and telephone wire. 100BASE-T is also referred to as Fast Ethernet.
FC-AL	Fibre channel arbitrated loop. A topology for Fibre Channel in which all devices are linked together in a loop.
FRU ID	A solution for capturing, transmitting, and analyzing field replaceable unit (FRU)-specific configuration, diagnosis, and failure information associated with a particular FRU.
Gigabit Ethernet	An Ethernet technology with transmission speeds up to 1 Gbps.
Horizontal scalability	Increasing throughput and reliability by running the same service on several machines at the same time. Any applications run in a horizontally scaled configuration must be stateless.
Host ID	The unique identifier assigned to the host computer.
Hot-pluggable	A feature that allows an administrator to add or remove a device such as a disk drive without affecting hardware system integrity.
Hot-swappable	A feature that allows an administrator to remove and/or replace a device without affecting software integrity. This means that, while the system does not need to be rebooted, the new component is not automatically recognized by the system.



Infrastructure services	Services that an SP runs to provide revenue services to clients. Examples include: firewalls, DNS, log processing, authentication, mail-relay, distributed SNMP, and low-end cache server.
I/O	Input/output. Transferring data between the CPU and any peripherals.
ISP	Internet service provider.
L2 cache	See Ecache.
LOM	Lights out management. A service and availability feature that monitors the system board, fan power and rpm, and temperature via a dedicated LOM serial port, combined console/LOM serial port, or alarm software that can be tied into SNMP. The LOM module also has a remote power on/off and cycle.
MTBF	Mean time between failures. The average time a component works without failure.
MTTR	Mean time to repair. The average time it takes to repair a component.
NEBS	Network Equipment Building Standard. A stringent standard for durability, grounding cables, and hardware interfaces specified by Telcordia Technologies (formerly Bellcore) for equipment used in Telco central offices.
NEPs	Network equipment providers.
NSPs	Network service providers.
POP	Point of presence. A local connection point, usually a telephone number provided by Internet service providers.
RAM	Random access memory.
Revenue services	Services for which an SP can collect payment from clients. Examples include: low-end Web server, low-end hosting server, and application server.
SCC(R)	System configuration card(reader). A device which allows a systems identity (Host ID/MAC address) to be stored on a replaceable card.
SCSI	Small computer systems interface. Pronounced "scuzzy." A hardware interface that allows the connection of up to 15 peripheral devices to a single bus.
SNMP MIBs	SNMP is a simple network management protocol used for managing complex networks. A MIB is a management information base used to map device-managed features to enable data to be returned to an SNMP requester.
SPECint95	A benchmark for integer performance.
SPECfp95	A benchmark for floating point performance.
SPECWeb99	A benchmark for Web performance.



SP	Service provider.
Sun Quad FastEthernet™	A Sun product that has four Fast Ethernet ports on the same I/O card.
TTY A	A serial port. Referred to as the console/LOM port.
TTY B	A serial port.
USB	Universal serial bus. An external bus standard supporting data rates up to 12 Mbps and up to 127 peripheral devices.
WAP	Wireless application protocol. Standard for providing handheld devices including cell phones and pagers with secure access to e-mail and text-based Web pages.



Materials Abstract

All materials will be available on SunWIN except where noted otherwise.

Collateral (cont.)	Description	Purpose	Distribution	Token # or COMAC Order #
Powerpack				
– <i>Netra 20 Server Just the Facts</i>	Reference Guide for the Netra 20 Server (this document)	Training Sales Tool	SunWIN, Reseller Web	308340
References				
– <i>Netra Family Chart</i>	Quick Reference Card	Sales Tool, Training	SunWIN COMAC	112822 FE1587-0
– <i>Netra Family Brochure</i>	Brochure		SunWIN COMAC	117279 BE963-1
– <i>Netra Family Guide</i>	Brochure		SunWIN COMAC	12769 BE1077-0
– <i>Resources Guide</i>	Brochure		SunWIN COMAC	122600 SE733-1
Product Literature				
– <i>Netra 20 Server Data Sheet</i>	Data Sheet	Sales Tool, Training	SunWIN	308100
– <i>Netra 20 Server Tech Spec</i>	printed, high impact specification sheet	Sales Tool	SunWIN COMAC	308101 DE1485
– <i>Customer Presentation</i>			SunWIN	133280
– <i>White Paper</i>			SunWIN	309320
– <i>Technical Presentation</i>			SunWIN	309321
External Web Site				
– <i>Netra 20 Server Web Site</i>	http://www.sun.com/products-n-solutions/hw/networking/netrat/t4/ http://www.sun.com/netra/products/netrat/t4			
Internal Web Site				
– <i>Netra Internal Web Site</i>	http://vsp.eng/products/hardware/netra/products/t4/index.html			
Reseller Web Site				
– <i>Sun Reseller General Information</i>	http://reseller.sun.com http://partner.sun.com/products/servers_feat.html			

